BM150 Class 2 Multimedia Module

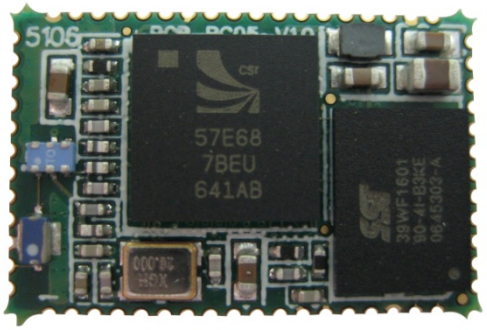
Bluetooth Qualified

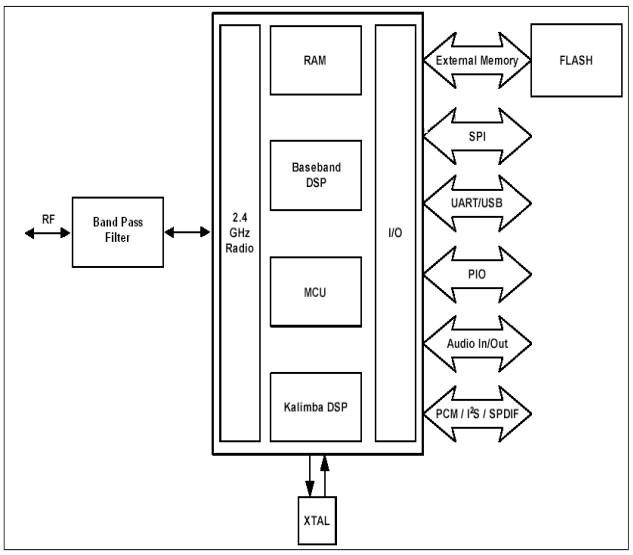
CSR, **BC57E687C**

Dec 2009

Features:

- Bluetooth Spec. V2.1+EDR Compliant
- Class 2 type Output Power
- Support Firmware Upgrade
- USB 1.1 and UART Host Interface
- Multi-Configurable I2S, PCM or SPDIF Interface
- Integrated Switched-Mode Regulator
- Integrated Battery Charger
- Integrated Microphone bias
- Integrated LED Driver
- Built in 16-bit Stereo Codec- 95dB SNR for DAC
- Factory configurable to either 1.8V or 3.3V supply.
- Supports up to 32Mbits of External Flash Memory (8Mbits Typical Requirement)
- Enhanced Audibility and Noise Cancellation
- Support for 802.11 Co-existence
- Size: 21mm x 13.5 mm x 2.35mm
- Weight: 0.8g





System Architecture

Product Description:

The BM150 is a Class 2 Bluetooth sub-system using BlueCore5-Multimedia External chipset from leading Bluetooth chipset supplier Cambridge Silicon Radio.

BM150 interfaces to 8Mbit of external Flash memory When used with the CSR Bluetooth software stack, it provides a fully compliant Bluetooth system to v2.1+EDR of the specification for data and voice communications

The module and device firmware is fully compliant with the Bluetooth specification v2.1+EDR

Applications:

- Hands-free Car Kit
- Stereo Headset
- AV Headphones
- Echo Cancellation
- High Performance Mono Headsets
- Analogue and USB Multimedia Dongles
- Wireless Speakers

Specifications:

Operating Frequency Band	2.4GHz ~ 2.48GHz unlicensed ISM band
Bluetooth Specification	V2.1+EDR
Output Power Class	Class 2
Operating Voltage	1.8V / 3.3V
Host Interface	USB 1.1 or UART
Audio Interface	PCM, I2S, SPDIF
Flash Memory Size	16M, Can Supports up to 32Mbits
Dimension	21mm (L) x 13.5 (W) mm x 2.35mm (H)

Specifications are subject to change without prior notice

Electrical Characteristics

Absolute Maximum Rating	Min	Max
Storage Temperature	-40°C	+85°C
Supply Voltage, (V_CHG)	-0.30V	+6.5V

Recommended Operating Conditions	Min	Max
Operating Temperature Range	-20°C	+70°C
Supply Voltage, (V_BAT)	2.5V	4.2V
Supply Voltage, (V_CHG)	4.5V	5.75V

Power Consumption	Units	Average
SCO Connection HV3 (30ms interval sniff mode)	mA	21
SCO Connection HV1	mA	40
ACL Data Transfer 115.2Kbps UART no traffic (Master)	mA	4.4
ACL Data Transfer 115.2Kbps UART no traffic (Slave)	mA	15
CODEC		
Microphone inputs and ADC/channel	mA	TBD
DAC and loudspeaker driver, no signal/channel	mA	TBD
Digital audio processing subsystem	mA	TBD

VBAT = 4.2V; f = 2.441GHz; T=20°C

RF Characteristics

Receiver	Units	Min	Typ	Max	Bluetooth Spec
Sensitivity at 0.1% BER	dBm	-	-90	-86	≤-70
Maximum Receiver Signal	dBm	-20	-10	-	≥ -20
C/I Co-Channel	dB	-	6	11	≤11
Adjacent Channel Selectivity C/I -1MHz	dB	-	-6	0	≤0
2nd Adjacent Channel Selectivity C/I -2MHz	dB	-	-38	-30	≤-30
3rd Adjacent Channel Selectivity C/I -3MHz	dB	-	-45	-40	≤-40
Image Rejection C/I	dB	-	-16	-9	≤-9

VBAT = 4.2V; f = 2.4441GHz; T=20°C

Transmitter	Units	Min	Typ	Max	Bluetooth Spec
RF Output Power	dBm	0	3	-	-6 to +4
RF Power Control Range	dB	16	24	-	> 16
RF Power Range Control Resolution	dB	-	0.5	-	-
20dB Bandwidth for Modulated Carrier	KHz	-	940	1000	<1000
2nd Adjacent Channel Power (+/- 2MHz)	dBm	-	-36	-20	≤-20
3rd Adjacent Channel Power (+/- 3MHz)	dBm	-	-45	-40	≤-40

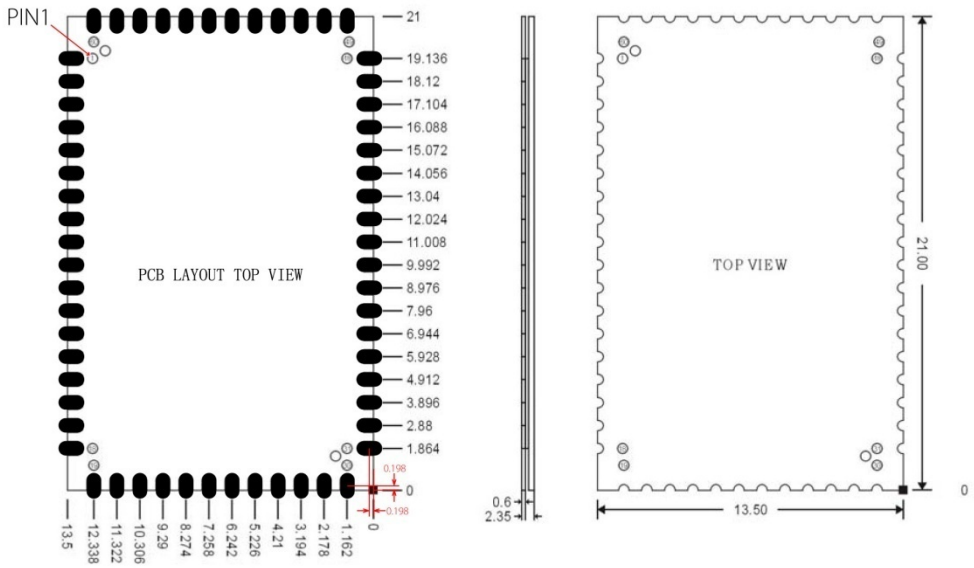
VBAT = 4.2V; f = 2.4441GHz; T=20°C
All specifications including pinouts and electrical specifications may be changed without prior notice

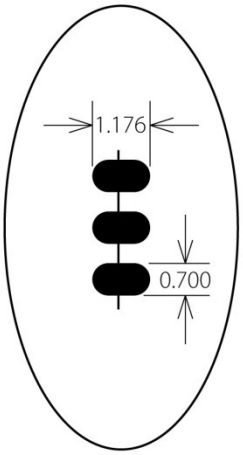
Pin Configurations

PIN NO.	NAME	TYPE	FUNCTION	RE-MARK
1	AIO1	Bi-directional	Programmable input/output line	
2	AIO0	Bi-directional	Programmable input/output line	
3	RESET	CMOS input with weak internal pull-up	Reset if low. Input debounced so must be low for >5ms to cause a reset	
4	GND	GND	Ground	
5	PIO9	Bi-directional	Programmable Input/Output Line	
6	PIO10	Bi-directional	Programmable Input/Output Line	
7	PIO11	Bi-directional	Programmable Input/Output Line	
8	PIO12	Bi-directional	Programmable Input/Output Line	
9	PIO13	Bi-directional	Programmable Input/Output Line	
10	PIO14	Bi-directional	Programmable Input/Output Line	
11	PIO15	Bi-directional	Programmable Input/Output Line	
12	GND	GND	Ground	
13	VDD	Power	+3.3V Supply	For 3.3V Version
	VDD	Power	Connect to +1V8	For 1.8V Version
14	VDD_USB	Power	Positive supply for UART/USB ports, Connect to VDD	
15	+1V8	Power	+1.8V Supply	
16	GND	GND	Ground	
17	USB_DP	Bi-directional	USB Data Plus	
18	USB_DN	Bi-directional	USB Data Minus	
19	UART_RTS	CMOS Output	UART Request To Send (Active Low)	
20	UART_CTS	CMOS Input	UART Clear To Send (Active Low)	
21	UART_RX	CMOS Input	UART Data Input (Active High)	
22	UART_TX	CMOS Output	UART Data Output (Active High)	
23	PCM_IN	CMOS Input	Synchronous Data Input	
24	PCM_SYNC	Bi-directional	Synchronous Data Sync	
25	PCM_CLK	Bi-directional	Synchronous Data Clock	
26	PCM_OUT	CMOS Output	Synchronous Data Output	
27	SPI_CSB	CMOS Input	Chip Select For Synchronous Serial Interface (Active Low)	
28	SPI_MISO	CMOS Output	Serial Peripheral Interface Data Output	
29	SPI_CLK	CMOS Input	Serial Peripheral Interface Clock	
30	SPI_MOSI	CMOS Input	Serial Peripheral Interface Data Input	
31	VRE_IN	Analogue	Take high to enable switch-mode regulator	
32	VDD_BAT	Battery terminal +ve	Lithium ion/polymer battery positive terminal. Battery charger output and input to switch-mode regulator	
33	GND	GND	Ground	
34	VDD_CHG	Charger input	Lithium ion/polymer battery charger input	
35	LED1	Open drain output	LED Driver	
36	LED0	Open drain output	LED Driver	
37	GND	GND	Ground	
38	SPK_L_N	Analogue	Speaker output negative, left	
39	SPK_L_P	Analogue	Speaker output positive, left	
40	SPK_R_N	Analogue	Speaker output negative, right	
41	SPK_R_P	Analogue	Speaker output positive, right	
42	GND	GND	Ground	
43	MIC_BIAS	Analogue	Microphone bias	
44	MIC_B_P	Analogue	Microphone input positive, right	
45	MIC_B_N	Analogue	Microphone input negative, right	
46	MIC_A_P	Analogue	Microphone input positive, left	
47	MIC_A_N	Analogue	Microphone input negative, left	
48	GND	GND	Ground	
49	PIO0	Bi-directional	Programmable Input/Output Line	
50	PIO1	Bi-directional	Programmable Input/Output Line	
51	PIO2	Bi-directional	Programmable Input/Output Line	
52	PIO3	Bi-directional	Programmable Input/Output Line	
53	PIO4	Bi-directional	Programmable Input/Output Line	
54	PIO5	Bi-directional	Programmable Input/Output Line	
55	PIO6	Bi-directional	Programmable Input/Output Line	
56	PIO7	Bi-directional	Programmable Input/Output Line	
57	PIO8	Bi-directional	Programmable Input/Output Line	
58	GND	GND	Ground	
59	RF-IN	RF	RF Interface	
60	GND	GND	Ground	

Recommended Layout patterns:

Physical Dimension Unit in mm

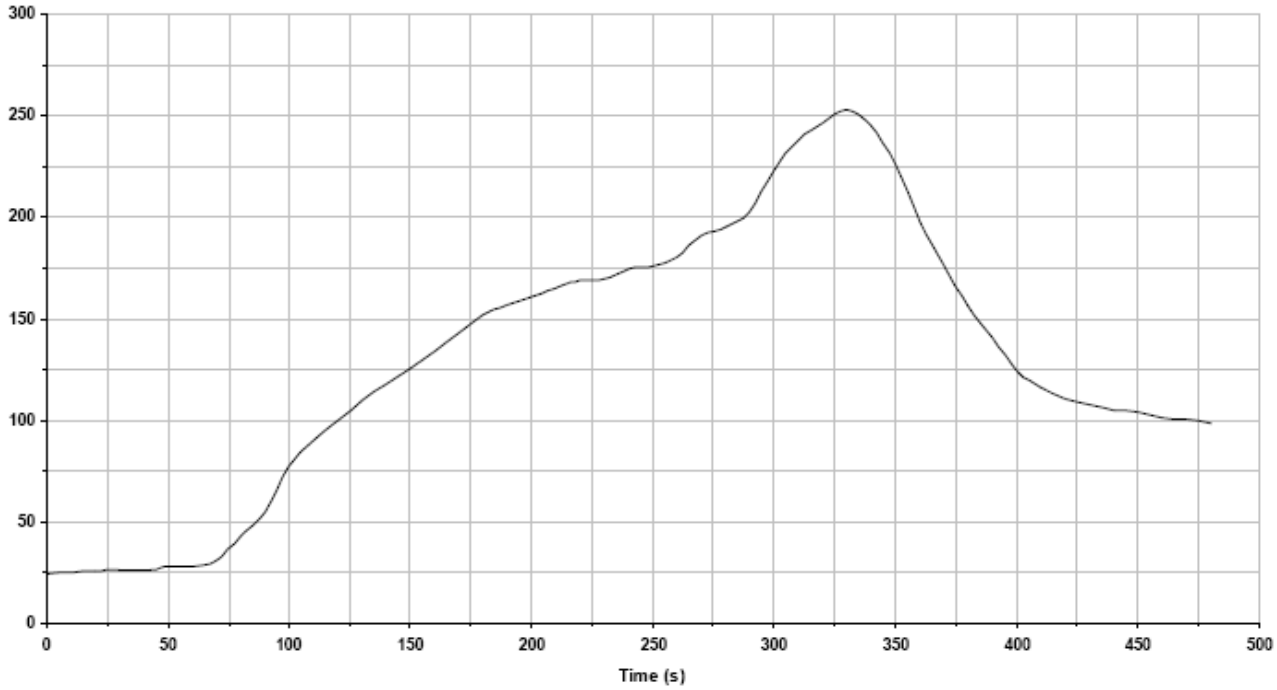




NO	PINNAME	NO	PINNAME
1	A101	31	VRE_IN
2	A100	32	VDD_BAT
3	RESET	33	GND
4	GND	34	VDD_CHG
5	P109	35	LE01
6	P1010	36	LED0
7	P1011	37	GND
8	P1012	38	SPK_L_N
9	P1013	39	SPK_L_P
10	P1014	40	SPK_R_N
11	P1015	41	SPK_R_P
12	GND	42	GND_S
13	VDD	43	MIC_BIAS
14	VDD_USB	44	MIC_B_P
15	+1V8	45	MIC_B_N
16	GND	46	MIC_A_P
17	USB_DP	47	MIC_A_N
18	USB_DN	48	CND
19	UART_RTS	49	PID0
20	USRT_CTS	50	PI01
21	UART_RX	51	PI02
22	UART_TX	52	PI03
23	PCM_IN	53	PI04
24	PCM_SYNC	54	PI05
25	PCM_CLK	55	PI06
26	PCM_OUT	56	PI07
27	SPI_CSB	57	PI08
28	SPI_MISO	58	GND
29	SPI_CLK	59	RF
30	SPI_MOSI	60	GND

Configuration

Recommended Reflow Temperature Profile:



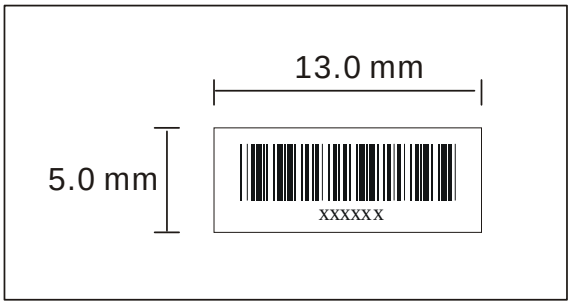
Key features of the profile:

-Initial Ramp=1-2.5℃/sec to 175℃ equilibrium
-Equilibrium time=60 to 80 seconds
-Ramp to Maximum temperature (250℃)=3℃/sec Max
-Time above liquidus temperature(217℃): 45 - 90 seconds
-Device absolute maximum reflow temperature: 250℃

MAC Address:

Each Module has his MAC Address
0002 3C XXXXXX

Concerning the dimension of the tab， only printing the last six letters of the LAP on the module.



The tab code pastes style:

QDL Certificate

Bluetooth SIG Qualification Design (QDL) Certificate

QDL Certificate: This certificate represents the Specifications declared by the Member as having passed the Bluetooth Qualification/Certification Process as specified within the Bluetooth Specifications and as required within the PRD 2.0.

Design Name: **Bluetooth Class 2 Multimedia Module (v2.1+EDR)**

Certified Bluetooth

This Product Design has passed the Bluetooth Qualification Process!

Specification Version: 2.1/2.1+EDR

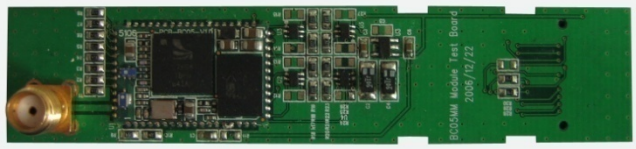
QDID: B014839

Declared Specifications: Baseband Conformance, Radio, Link Manager, Summary ICS, Product Type

Member Company:	Requirements:	Project Dates:
Sunitec 10F.-1, No.200, Jingping Rd. Jhonghe City, Taipei County 23581 T BQE: H.M. Chen	1. Testing 2. Documentation 3. Assessment 4. Declaration 5. Listing 6. Marking 7. Compliance to Auditing and Enforcement	Assessment Date: December/08/2008 Listing Date: December/08/2008

Ordering Information

No	Items	Ordering Code (Class 2)	Description
2	BC05mm-ext Module-3V3	BM153-N	Operating Voltage is 3.3V, without CVC
3	BC05mm-ext Module Test Kit	BM150 TK	Test kit to fit CSR Casira Kit
4	Titan is Antenna	2010B4844-01	GigaAnt 2.4GHz Swivel SMA Antenna



BM150 Test Kit

Titanis Antenna

Document References

References	Version
Specifications of the Bluetooth System	V2.1+EDR, 26 July 2007
BlueCore5-Multimedia External Product Data Sheet	CS-121064-DSP2 15 July 2008

Document History

Revision	Date	History
Draft V0.1	2006-12-12	
V1.0	2007-04-12	First release
V2.0	2008-09-11	Update from Revision V1.0
V3.0	2008-09-19	Update from Revision V2.0
V4.0	2009-05-22	Update from V2.0+EDR compliant to V2.1+EDR compliant
V4.1	2009-07-30	Update from printing MAC address “UAP” to “LAP”
V4.2	2009-08-22	Remove BC57E687B-ITB-E4 from BOM
V4.3	2009-12-02	Modify page 3 PIN OUT mistake (Swap AIO0 and AIO1)

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